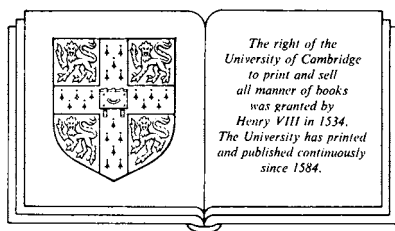


Power and Penury

*Government, technology and science in
Philip II's Spain*

DAVID C. GOODMAN

*Lecturer in History of Science and Technology
The Open University*



CAMBRIDGE UNIVERSITY PRESS

Cambridge

New York New Rochelle

Melbourne Sydney

PUBLISHED BY THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE
The Pitt Building, Trumpington Street, Cambridge, United Kingdom

CAMBRIDGE UNIVERSITY PRESS

The Edinburgh Building, Cambridge CB2 2RU, UK

40 West 20th Street, New York NY 10011-4211, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

Ruiz de Alarcón 13, 28014 Madrid, Spain

Dock House, The Waterfront, Cape Town 8001, South Africa

<http://www.cambridge.org>

© Cambridge University Press 1988

This book is in copyright. Subject to statutory exception
and to the provisions of relevant collective licensing agreements,
no reproduction of any part may take place without
the written permission of Cambridge University Press.

First published 1988

First paperback edition 2002

A catalogue record for this book is available from the British Library

Library of Congress Cataloguing in Publication data

Goodman, David C.

Power and penury: government, technology, and science in Philip II's
Spain / David C. Goodman.

p. cm.

Bibliography: p.

Includes index.

ISBN 0 521 30532 2

1. Technology and state – Spain – History – 16th century. 2. Science
and state – Spain – History – 16th century. 3. Philip II, King of Spain, 1527–
1598. I. Title.

T26.S7G66 1988

338.94606–dc19 87-24630 CIP

ISBN 0 521 30532 2 hardback

ISBN 0 521 52477 6 paperback

Contents

	<i>page</i>
<i>List of illustrations</i>	vii
<i>Preface</i>	viii
<i>Abbreviations</i>	ix
<i>Glossary</i>	x
1 The occult sciences: the crown's support and controls	1
1 Philip II and the occult	
2 The Inquisition's censure and other clerical opinion	
3 Lay opinion and popular beliefs	
4 <i>Conversos</i> , Moriscos and the occult	
2 Cosmography and the crown	50
1 Criticism of Aristotelian cosmology and its repercussions	
2 Longitude and politics	
3 Royal projects to survey Spain and the Indies	
4 Provisions for the perfection of navigation	
3 Technology for war	88
1 Philip II and shipbuilding	
2 Artillery and munitions	
3 Gunners and engineers	
4 Secret inventions for war	
4 Producing the king's silver	151
1 The rise and fall of Guadalcanal	
2 Silver from the Indies	
3 A new role for the mine at Almadén	

5	The crown's interest in medicine	209
1	Royal hospitals for the poor, the sick and the workers	
2	The king's control of medical practice	
3	The king's medical establishment and the search for medicinal plants	
4	Medical services for the military	
	Conclusion	261
	<i>Bibliography</i>	265
	<i>Index</i>	271

Illustrations

<i>Plates</i>		<i>Page</i>
1	Portrait of Pedro de Medina	60
2	An engineer's sketch-map of the hinterland of Vinaroz	94
3	Cannon for the defence of the Canaries	116
4	The citadel at Jaca	128
5	Invention to protect infantry from cavalry charges	131
6	Invention to protect armadas from fire-ships	135
7	Invention to facilitate the supply of drinking water to Spanish soldiers	138
8	Philip II's pragmatic of 1559 incorporating Spain's mines within the crown	166
9	The Andean silver mine of Potosí	178
10a, b	Officially prescribed techniques for treating dislocations of the spine	228
11	Medicinal plant from the New World	237
<i>Maps</i>		
1	The Iberian Peninsula	xi
2	Viceroyalties of New Spain and Peru	181

The occult sciences: the crown's support and controls

In July 1566 Martín de Ayala, archbishop of Valencia and former professor of philosophy at Alcalá, lay on his death-bed recording the events of his troubled life. He did not know exactly how old he was because his mother had forgotten the year of his birth; records of baptism were not regularly kept in Spain until after the Council of Trent. But he was certain about the day of his birth, St Martin's Day, in November, when the sun was in the sign of Sagittarius. And he believed that this constellation was the cause of the extreme difficulty experienced by his mother in giving birth, the cause of adverse effects in the countryside, and the cause of vexation throughout his life. This learned prelate was convinced that the predictions of astrologers were 'fully confirmed' by his own experience.¹

In 1576 Diego Enríquez, serving as commander of the elite regiment of *tercios* in Philip's kingdom of Sicily, witnessed extraordinary scenes during an outbreak of plague in Trápani which altered his beliefs. The streets were full of people running towards churches, telling of a miraculous sweating of holy statues, which like the plague they saw as a sign of God's wrath. At first sceptical Enríquez was astounded to see the statue of St Sebastian sweating drops 'just like a body affected by great fatigue', and soon he was left in no doubt that two crucifixes, similarly oozing water, had miraculously cured two victims of the plague merely by being brought to them. Describing these events in a letter to the president of Sicily, the duke of Terranova, Enríquez said his reason for writing was that until then he had been 'very incredulous but from what I have seen I now readily believe'.²

Another example of contemporary beliefs: in Velilla de Ebro (Aragón) there was a church whose bell was supposed to ring without human agency; it was taken to be a miraculous warning

from heaven of important events. The bell was alleged to have rung at the deaths of Philip II's father, mother and two of his wives. And when the bell rang again in June 1601 testimony of this miracle was given by local notaries, magistrates and by Acencio del Molino, a surgeon of Zaragoza³, and interpreted as divine displeasure at the continued presence in Spain of Mohammedans.

These examples illustrate the acceptance of superstitious or occult beliefs at various levels of Spanish society. Spanish historians used to argue that Spain in the sixteenth and seventeenth centuries was commendably free from magic and the occult, that what little there was proceeded from rural ignorance rather than evil intention, and that superstition took no worse a form than the benign use of spells to cure rabies or remove locusts.⁴ This rosy view has since been invalidated by historians such as Caro Baroja⁵, who has demonstrated the widespread participation of Spaniards in occult practices, well-intentioned and otherwise. Early modern Spain was no different in this respect from France, Italy or Germany, where the predilection for superstition and the occult, in addition to orthodox religious beliefs, led the French historian Lucien Febvre to describe the sixteenth century as '*le siècle qui veut croire*'.

'Superstition' is a word which the historian has to use with care; but it is not anachronistic here. In the sixteenth century its clear definition and usage were important not only for officials of state and church who sought to eradicate suspect beliefs and legislate against practices associated with them, but also for practitioners of occult sciences who were anxious to justify their activities as licit. In central Europe Trithemius and Agrippa had distinguished their 'natural magic', the excellent contemplation and application of nature's secrets, from reprehensible demonic magic and superstition. Agrippa regretted that the uninformed confused natural and black magic; and Paracelsus' alchemy was liable to bring from his enemies accusations of consorting with the devil. In Spain the same confusion tended to occur. Alejo Venegas, an author of philosophical and religious works, wrote:

The art of magic is the art of sages. It is of two types: one is called 'occult philosophy' which is the science of natural secrets; the other is 'superstition' and involves an occult pact with the devil. There is hardly one good writer on the first who does not also dabble in the second. And so it is better to study neither one nor the other; more harm than good can come from Cornelius Agrippa's books on occult philosophy.⁶

1 Philip II and the occult

Philip II, at the summit of Spanish society, had the power to influence opinion. How did he react to contemporary interest in the occult? This aspect of his intriguing personality has brought conflicting interpretations ever since his reign. The black portrayal of Philip in Protestant propaganda presented him as the incarnation of evil. When William of Orange, leader of the Dutch Revolt against Philip, had a price put on his head – he was eventually murdered – he accused Philip of ‘diabolical machinations’ and of conspiring to kill him by poisoning, which at the time was associated with sorcery. Completely different eulogistic portrayals appeared in seventeenth-century Spain, notably Baltasar Porreño’s *Dichos y hechos del Rey D. Felipe II* (1628), which presented Philip as a man whose pure Catholic faith and prudent mind kept him free from all types of superstitious beliefs and offensive arts. Porreño tells how Philip dismissed an astrologer and tore up his treatise containing the horoscope and predicted life of the future Philip III, making it clear that such works were useless, vain and impious. And similarly how Philip ordered the publication of an astrologer’s forecast for 1579 because its dire predictions had not come to pass, in order to expose the worthlessness of astrological divination and to show how little it deserved the attention of Christians. Porreño also relates how Philip frequently did the reverse of what predictions advised, such as purposely setting out on journeys on Tuesdays, supposed by some to be unlucky days.⁷

Porreño’s hagiographic account, though based on unsupported anecdotes, has continued to be drawn upon in recent historical writing. When in 1914 an Augustinian monk published an astrological manuscript from the Escorial, a horoscope of Philip prepared around 1550 by Matthias Hacus, a physician and mathematician from northern Europe, the monk quoted from Porreño and commented that ‘we can imagine Philip laughing at his horoscope and intentionally acting contrary to its predictions’.⁸ Perhaps Porreño’s biography also led Bratli, a Danish historian, in his study of 1911, to conclude that ‘on one point in particular Philip proved himself intellectually superior to his age: he was not superstitious and was always contemptuous of the auguries and prophecies of astrologers’.⁹

Yet Philip did not tear up Hacus’ prognostication, but kept it

until his death, one of the hundred especially cherished books which he kept for himself after he had donated others to the Escorial library.¹⁰ This, by far the most detailed of the several horoscopes of Philip known to exist,¹¹ predicted that his birth under the influence of Jupiter and Saturn would dispose him to be just in administration, brave, and studious; that these celestial influences, disposed by divine providence, would bring Philip's subjects great advantages through his strengthening of true religion and his opposition to usury. He would be loved not only by his own people but also by his enemies. There would be difficulties ahead and because Mars had been influential at the time of his birth Philip would have to be 'more of a warrior than his father, the Emperor'; but in the end he would achieve victory over false religions. He would marry three or four times, have two surviving sons, one excellent and the other a disgrace, and he would live to at least 60 and have a gentle end. There was a good deal of comfort here and perhaps that helps to explain why Philip kept it.

The inadequacy of previous accounts of Philip's attitude to astrology has been shown in Taylor's impressive essay¹² which argues for Philip's deep involvement in the occult. Taylor has demonstrated the correspondence of star diagrams in the astrological frescos of the Escorial library to Hacus' horoscope of Philip. He argues that the frescos were inspired by Juan de Herrera, Philip's confidant and certainly a devotee of occult philosophy¹³, who succeeded Juan Bautista de Toledo as the principal architect of the Escorial. In fact Taylor interprets the Escorial as a magical design based on the circle, square and triangle, supporting this, less convincingly, with the reflection that Juan Bautista de Toledo, who designed the building, had lived in Naples, 'one of the chief centres of magic in Europe'. And he reveals that the foundation stones of the Escorial and later of its church were both laid at astrologically auspicious times, when Jupiter and Saturn, the two planets associated with Philip, were in conjunction. All of this, according to Taylor, had Philip's approval, and added to the large number of works on the occult in the Escorial library, establishes Philip's commitment to the occult.

Other parts of Taylor's argument are less persuasive, such as his view that 'the king's introspective character would fit in with an interest in astrology and the occult'. And although *Picatrix*, a magical treatise and one of many Hermetic works in the Escorial,

recommended the wearing of black as an effective means of attracting the beneficial influence of Saturn, there is no reason to suppose that this was why Philip wore black – black dress was commonly worn by noblemen at the time. Taylor almost certainly exaggerates when he considers that Philip made Herrera his constant companion in order to be his Magus and perform occult services for him. Herrera's services were often divorced from magic, as in his design of giant rotating cranes to lift large stones from quarries and position them on the rising structure of the Escorial. There was no hint of magic in his explanation to Philip of their mechanism, merely a straight Archimedean account of the principle of the lever.¹⁴ And although some occult philosophy entered the curriculum of the Academy of Mathematics in Madrid, which Herrera persuaded Philip to establish and which Herrera directed, much of the teaching was concerned with non-magical military engineering, navigation and cosmography.

Kubler, another historian of art, has entered the debate, rejecting Taylor's interpretation. He argues that the Escorial was not based on magical designs but on rational aesthetics, derived from Augustine's Platonic ideas of harmony and the correspondence of parts to the whole. And as for the astrological frescos, he denies that they were due to Herrera and attributes them instead to the Hieronimite monk José de Sigüenza, librarian of the Escorial and chronicler of its construction. This conclusion changes the interpretation because Kubler accepts Sigüenza's statement that the reasons for the astrological frescos were that a royal library 'must include every taste', and to show, in accordance with God's intentions, that men had nothing to fear from stellar influences because the power of prayer and repentance was greater. Kubler supposes that this also represents Philip's opinion and, using Porreño's anecdotes for support, arrived at the unacceptably simple conclusion that Philip was consistently hostile to astrology.¹⁵

Other sources, including some new evidence, help to clarify Philip's attitude to astrology; but ambiguities remain. Cabrera de Córdoba, the meticulous chronicler of the reign, told how Philip's court attracted diviners and tricksters.¹⁶ Several astrological discourses were certainly sent by authors seeking profitable employment in the royal service, assuming that Philip would take them seriously. In 1577 someone who had served Philip in an unspecified way in Flanders sent his account of the significance of the recent

comet which had startled Europe by its size and caused fear from the widespread belief that comets were harbingers of disaster. There were grounds for supposing Philip might be interested because for centuries comets had been associated with the death of princes, based on the doctrine of the pseudo-Ptolemaic *Centiloquium*. The astrologer assured Philip that the comet 'has no significance for His Majesty's health' but that its location portended the violent death of William of Orange. There was such 'antipathy' between the horoscopes of the two men that it was inevitable that there was war between them, and now the comet showed that 'God was with your Majesty'. He thought it confirmed the meaning of the disposition of the constellations when the Escorial was begun, that 'Your Majesty should take courage in subduing his enemies like an all-destroying ray'. And if Philip wished he would explain how the constellations indicated the decline of Mohammedanism.¹⁷

A book on the significance of comets was dedicated to Philip by Bartolomé Barrientos of the university of Salamanca; it pointed out that comets were 'not always' signs of disaster to come.¹⁸ And in January 1573 Antonio Gracián, royal secretary, thought Philip should see two discussions of a comet, one by López de Velasco, cosmographer of the Indies.¹⁹

There is no indication of Philip's reaction to any of these discussions. But when Gracián wrote another letter to him on comets Philip's reply left a unique record of his views on an astrological matter. The sceptical Gracián, informing Philip that the *corregidor* (civil governor appointed by the crown) of Carmona had sent his thoughts on the significance of the recent comet, commented that the urge to prophecy had become so widespread that 'even *corregidores* were now afflicted with the disease', and added that in antiquity the Romans would have given the comet their full attention. Philip replied sceptically that 'because the Romans were not Christians they believed whatever they liked'.²⁰

Another of the king's servants, Giovanni-Battista Gesio frequently supplied astrological advice on foreign policy. Gesio had come to Madrid from his native Naples in the 1560s and served Philip as an expert in cosmography and mathematics. He invented an undecipherable code²¹ for the most secret parts of Philip's correspondence and spent several years in the 1570s at the embassy in Lisbon, arguing for Philip's rights in the disputes with Portugal on territorial possessions overseas. In 1578 after a decade of Spain's

increasing military involvement in the Netherlands, Gesio informed Philip that the signs in the heavens clearly indicated the need for firm action with the rebels, for 'certain diseases required violent remedies if they were not to recur'. Therefore the king should concentrate his forces in Flanders into a single stronghold and mete out exemplary punishments to rebels. Astrology showed that in this way 'Your Majesty will be able to restore religion by arms, impose new laws and increase the royal patrimony with the wealth and estates of rebels'.²² This would hardly have impressed Philip as novel and inspired counsel, since this very policy had already been recently implemented to great effect. In July 1577 Don Juan of Austria, Philip's governor-general of the Netherlands, had seized the citadel of Namur, concentrated his forces there, and the following January routed the rebel army at Gembloux. Two months later Gesio communicated his celestial wisdom to the king.

But it was the Portuguese succession which occasioned most of Gesio's astrological advice. Sebastian of Portugal, ignoring the views of Philip, his uncle, had proceeded with his disastrous crusade into Africa and was killed at Alcázarquivir (1578). The unexpected death of the young monarch brought the ageing Cardinal Henry to the throne and the prospect of a disputed succession. There were several contenders: Catherine of Braganza; Ranuccio Farnese; Antonio, prior of Crato, the illegitimate nephew of Cardinal Henry; and Philip II whose strong claim was through his mother, Isabella of the royal house of Portugal. In the midst of the impending crisis, Gesio sent Philip a lengthy discourse demonstrating that 'the inheritance of the Kingdom of Portugal belongs to Your Majesty by laws divine and natural' in which he argued from analogies based on the laws of geometry, perspective, music, hydrostatics, and above all on astrology.²³ Representing Manuel of Portugal and his descendants as planets, he drew a diagram to show how royal power was communicated like planetary virtues. He compared the female claimants to retrograde planets which neither received nor communicated virtue, and eliminated them also because females were 'created to obey and not to rule'. His argument eventually concluded that the Portuguese crown necessarily passed to Philip. And he later tried to strengthen this from recently observed celestial phenomena²⁴, the 'writing in the heavens' which was the visible sign of divine intentions. Eclipses seen in the meridian of Lisbon, Madrid and again at the moment

of Cardinal Henry's death confirmed where the rightful succession lay. But Gesio warned Philip that 'it was an error to suppose celestial benefits come without effort, for the stars do no more than dispose and facilitate this; to win the gifts they promise, it is also essential to act to frustrate the designs of opponents'. He therefore urged Philip to take the necessary military and political action to secure what was his by right.

Philip used diplomacy to press his case in Lisbon and after the death of King-Cardinal Henry in January 1580 he used his military power to annexe Portugal, crushing the resistance of Antonio and his supporters. But there is nothing to suggest that Philip took any guidance from Gesio's astrological reflections; if anything the evidence suggests the reverse because, to his astonishment and dismay, Gesio was recalled from Lisbon in 1579 at a time when he felt 'it would have been better for me to have been present at the dispute and not sent away'.²⁵ Back in Madrid he continued to write to the king reassuring him that astrology guaranteed that Portugal would be his within months.²⁶

Philip's attitude is not clearly revealed in the few legislative initiatives which touched on astrology. When in 1571 the *Cortes* of Madrid complained of the inadequacy of medical treatment and blamed physicians' ignorance of planetary motions, it pressed Philip 'to order that henceforth no physician may graduate from any university without the degree of bachelor in astrology'. Philip's response was to ask members of his council to deliberate with the universities 'to see what should be done'.²⁷ Historians have seen this as an indication of Philip's lack of interest;²⁸ but this may well be a misinterpretation: although no royal establishment of chairs in astrology was announced, a genuine intention on Philip's part to pursue the suggestion cannot be ruled out. Philip's protection of astrology might be evident in legislation at another session of the *Cortes* of Madrid at the end of his reign. This was a reenactment of Juan II's fifteenth-century decree prohibiting divination from 'words, the casting of lots, spells, the inspection of water, crystal or mirrors'. Philip ordered the introduction of more effective measures to secure its enforcement, to eradicate such 'divinations, spells and other superstitious things'; it is noteworthy that there was no specific reference to astrological divination.²⁹

The evidence therefore points both ways and no simple statement on Philip's astrological beliefs will do. His interest fell short of

total commitment and his reservations never amounted to consistent hostility; his was a middle position of restrained curiosity.

Philip's attachment to the occult works of the medieval Majorcan philosopher Raymund Lull is clearer and well known, though his motives remain obscure. Lull's principal work, the 'Great Art', promised his disciples a rapid acquisition of knowledge, not only of nature's secrets but also of religious mysteries; it served the burning passion of his life – to convert unbelievers, especially Mohammedans to Christianity. The Art consisted of manipulating letters symbolising attributes of God (goodness, power, eternity) and the parts of the cosmos (the signs of the zodiac, animals and plants, the four sublunar elements).³⁰ The Art would reveal the secrets of medicine and elucidate the deepest mysteries of faith, the Incarnation and the Trinity.

Apart from Lull's authentic works, many spurious alchemical and Kabbalistic treatises were attributed to him, adding to his reputation as a magician. Juan Vileta, a Lullist canon of Barcelona who advised Philip on where Lull's treatises could be found, identified Lull with the most famous sage of occult philosophy, Hermes Trismegistus.³¹ There were ardent followers of Lull in several parts of sixteenth-century Europe. Apart from the strongly-rooted tradition in Majorca, where his doctrines continued to be taught at the university of Palma, a chair of Lullist philosophy had been created in Paris; in Prague Philip's ambassador Guillén de San Clemente was said to have boasted of his descent from Lull.³² Herrera's interest in Lull's doctrines was pronounced. His library, richly stocked with Lullist treatises; his own Lullist discourse on the properties of the cube; and his plan in an early will to establish a Lullist teaching institute in his birthplace near Santander all show the degree of his enthusiasm. And Herrera's constant presence awakened the king's interest.

By 1577 Philip was taking steps to secure a rapid collection of Lull's writings for the library of the Escorial. When Arias Montano, the distinguished biblical scholar, was instructed 'to procure for the royal library all of Raymond Lull's works, or as many as I can find', he replied that this would best be done through the viceroys of Catalonia and Aragón, and that he would inform them where many of the treatises could be found and who owned them. Ecclesiastical authorities in Catalonia and Majorca were similarly approached.³³ By these means the Escorial library soon housed

numerous Lullist and pseudo-Lullist works; they were read and annotated by Philip.

A contemporary record of Philip's enthusiasm comes from Juan Seguí, canon and later rector of the university of Palma, Majorca where he directed Lullist studies. In 1580, while accompanying Philip on his way to Lisbon to receive the crown of Portugal, he and the king discussed Lull. The king asked Seguí to write a brief account of Lull's life, which he at once began and completed in Lisbon.³⁴ Seguí himself saw Lull's Art as the way to Christian truth and of particular contemporary value 'when for our sins our Church is so infested with heretics'. He looked to the monarchy to create colleges from where students, taught Lull's Art and 'the tongues of the infidel in Persia, Malacca, Angola, Congo, Brazil and Peru' would go out, willing to serve God and die for the faith, so imitating Lull's example.³⁵ Nothing as ambitious as this was ever undertaken by Philip, but he did act on Herrera's advice to introduce Lull's philosophy at the Academy of Mathematics in Madrid; and for this purpose translations of Lull's *Ars magna* and *Arbor scientiae* were prepared by Pedro de Guevara, who put them 'in our Castilian language in accordance with Your Majesty's wish to facilitate the teaching of all sciences in your Academy'.³⁶

Lull's philosophy was not beyond suspicion; in the fourteenth century it had been condemned by the Aragonese Inquisition and since then by several popes.³⁷ When Philip considered the introduction of Lull's doctrines at the college for Hieronymites within the Escorial, Gesio advised strongly against it. The grandeur and harmony of the Escorial would bring Philip epithets like 'the magnificent' or 'resplendent'; but 'Your Majesty's reputation would not be assisted by the introduction there of the so-called art and science of Lull, which is neither a science nor an art, because science teaches us to know by demonstration, and art has its principles'. Lull's doctrines were as false as the teachings of Mohammed. And Lull's promise of acquiring all sciences in a short time would attract 'only the pusillanimous', because 'practitioners of his art will know nothing in thousands of years'.³⁸ Gesio's opinion was completely at odds with Philip's.

Philip exerted pressure on Rome in an attempt to remove Lull's notorious reputation there, even to the point of seeking his canonisation. Why was Lull's philosophy so attractive to Philip? Did he see it as the key to universal knowledge, as a way to elucidate

religious mysteries, or as a means of converting the infidel? These aims were not separable for Lull though they may have been for Philip. We know from the prologue to Seguí's life of Lull that Philip's favourite work of Lull was the *Blanquerna*; but unfortunately that does not help us to isolate any particular part of the doctrine for the usual blend of themes occurs. In this myth *Blanquerna*, after achieving wisdom through contemplation in a forest, becomes pope and teaches Lull's Art, promising that this would secure not only the mastery of theology, medicine and other natural science, but also the conversion of the Infidel.

In the Escorial library pseudo-Lullian works formed part of the large collection of treatises on alchemy,³⁹ in the practice of which Philip became involved. Venice was an important source of many manuscripts and printed books on alchemy and other occult science purchased for the Escorial. In April 1572 the king instructed his ambassador in Venice, Diego Guzman de Silva, to investigate the availability of rare books and manuscripts, 'chiefly of some antiquity, many of which, it is believed, can be found in that city or in other parts of its territory' and 'to acquaint yourself with persons who know about these things and inform me of all in detail'.⁴⁰ Book-purchasing soon began; between May 1572 and July 1573 the ambassador bought 167 Greek and 234 Latin manuscripts at a cost of 637 *escudos* from booksellers and individual collectors such as Matteo Dandolo.⁴¹ Twenty-six alchemical manuscripts, in Latin and Italian, were bought from a German, Daniel Ulstath; these included the *Codicillus* and other spurious works attributed to Lull; texts attributed to Geber; works by Arnaldo de Villanova, John of Rupecissa and Christopher of Paris; and anonymous treatises on transmutation.⁴² Two brothers from Corfu, Nicephoro and Michel Eparcho, supplied 64 ancient Greek manuscripts including an anonymous work listed as *liber de inveniendis Thesaurus hoc est de Alchimia*.⁴³ Cases of books continued to arrive at Alicante from Venice in 1579.⁴⁴

Philip first became involved in alchemical experiments during his stay in the Netherlands (1555–9). He had been called there by his father, the Emperor Charles V, who in formal acts of abdication passed on to him the lordship of the seventeen provinces, and soon afterwards the crowns of Castile and Aragón. Philip's stay was prolonged by the recurrence of war with France; a French force attacked Douai in 1557. Philip also inherited the huge debts of the

Castilian monarchy, and now the demands of war made the financial crisis even more severe. In 1557 Philip suspended the payment of debts and, according to the reports of Michele Suriano, Venetian ambassador in Brussels, sought an alchemical remedy for his shortage of money; the imports of American silver, though significant, had not yet attained the huge quantities that flooded in after 1560, especially in the 1590s. Suriano said that Philip had first engaged an Italian alchemist, Tiberio della Rocca, and later a German, whose experiments in Mechelen, using 'an ounce of his powder' converted six ounces of mercury to six of silver; the silver stood the test of hammering but not fire. Suriano added that Philip was pleased with the result and wanted to pay his troops with this silver but the provinces wouldn't accept the inferior currency.⁴⁵ More details were revealed by the next Venetian ambassador, who reported that he had interviewed the German, who was called Peter Sternberg, and that this alchemist working under the supervision of Ruy Gómez de Silva, Philip's friend and councillor of state, was paid 2000 ducats. He added that the king was present at some of the experiments.⁴⁶

Suriano described these attempts to manufacture silver as 'not very honourable' and thought that was why Philip had tried to keep them secret. The reputation of some sixteenth-century monarchs suffered by dabbling in alchemy. This happened to Philip's nephew, the Emperor Rudolf II, whose withdrawal from affairs of state was blamed on the diversions of alchemy and his other passions for the occult. And it also seems to have happened to Ernest of Bavaria, whose election as prince-bishop of Liège was soon regretted by his ecclesiastical electors and the population because he was neglecting government for alchemy.⁴⁷ Alchemy was frequently seen as frivolous or potentially sinful through its association with fraud. Gesio advised Philip that 'evil works are always blamed on their authors; nobles acquire infamy from alchemical or false silver or gold'.⁴⁸ But after his return to Spain Philip continued to give patronage to alchemists, though he never neglected affairs of state in order to perform experiments himself.

His confidence in the transmutation of base into precious metals was shaken by the outcome of experiments, secret and prolonged, by unnamed alchemists working in 1567 in a house in Madrid under the supervision of Philip's optimistic secretary, Pedro de Hoyo.⁴⁹ The experiments were attempts to produce gold from